

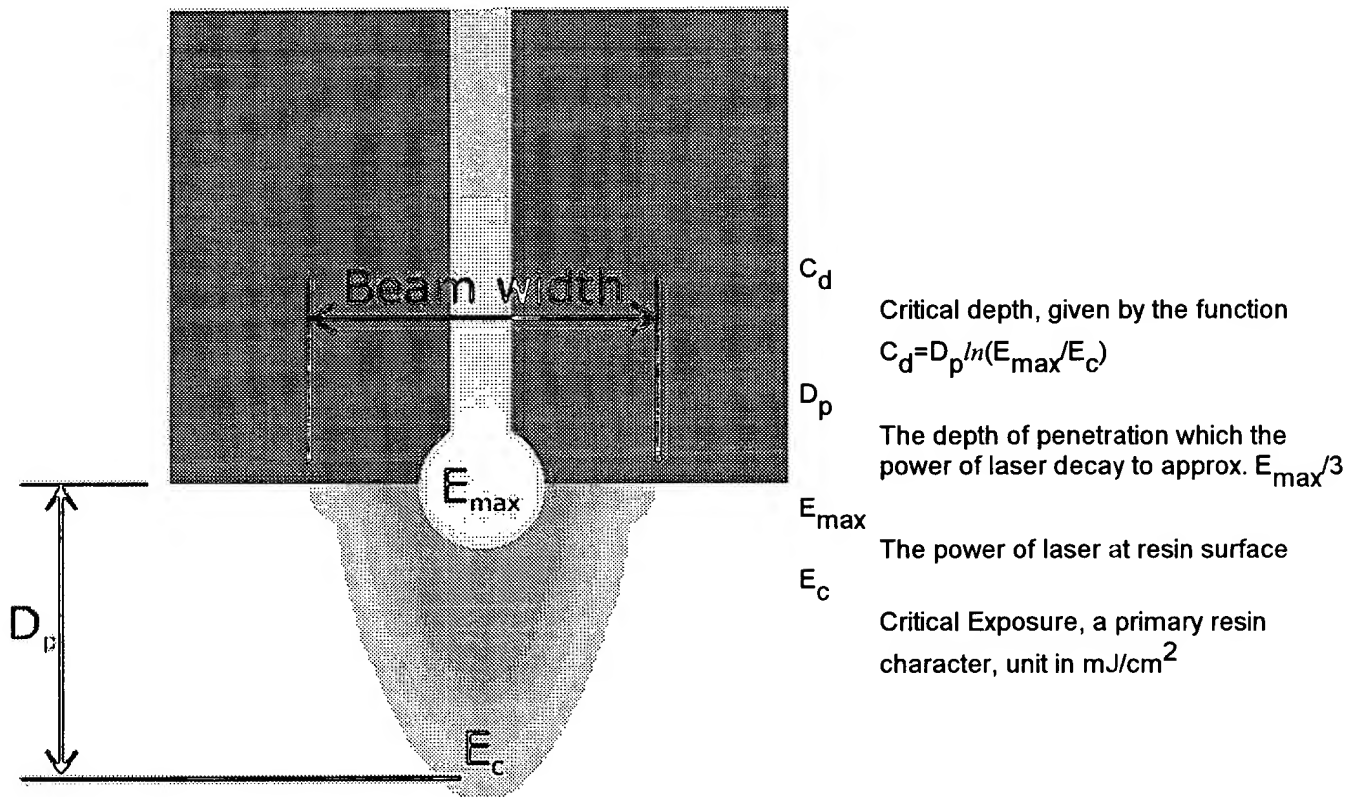
SLA system overview

Wai Hon Wah  Draft Version

Introduction

Curing mechanism

When a beam of light hit the resin surface, it will cure a region of resin in the shape of a bullet. The intensity of the beam determine the extend of reaction and the size of the bullet.



In the process, D_p and E_c is primary characters of the resin provided by manufacturer. The SLA machine determine P_L and V_s on the fly by the relation that the draw speed of the laser V_s proportional to $(P_L/E_c) \exp(-C_d/D_p)$.

Other parameters, such as X/Y/Z shrinkage and beam width, are determined in the Accumax® calibration process

Scanning sequence

The laser draw each slice of the part similar to zigzag milling of a CNC.

Click [here](#) for a close up view of the X and Y hatching process

Material

A variety of resin is available for SLA, each with its own advantage and weakness.

Resin used in SLA process are mixture of photo-initiator and monomer mixture in liquid state, external energy source will trigger the chain reaction of polymerization. The external energy can be in the form of heat or light wave, and the shrinkage of the resin varies according to the form of energy supplied.

The resin are stored in an environment with tight temperature control. For example, the chamber of SLA are maintained at $28^{\circ}\text{C} \pm 1^{\circ}\text{C}$.

Typical SLA resins only react to a narrow bandwidth of UV ray, as different model of SLA machine use different laser, resin is generally not interchangeable.

SL 5170[[Specifications](#)] Multi-purpose Material

Cibatool SL 5170 is an epoxy-based resin that offers the greatest degree of accuracy available in any rapid prototyping process. Parts are strong, durable and multifunctional. SL 5170 fits a wide range of applications from form, fit and function to optical stress analysis, and as masters for secondary tooling applications. SL 5170 has several material properties which exceed or are comparable to medium-impact polystyrene.

Ideal for:

- Optical stress analysis
- Investment casting patterns
- Snap-fit assemblies
- Concept models
- Visual models
- Working prototypes

SL 5210 [[Specifications](#)] Specialty Material

Cibatool SL 5210 is an advanced vinyl ether/acrylate-based resin which is a perfect solution for functional prototypes which demand high-temperature or water immersion testing. Capable of withstanding temperatures in excess of 100°C (212°F), SL 5210 offers the highest heat-resistance of any previously released material.

Ideal for:

- Under-the-hood testing
- Underwater testing
- Wind-tunnel models
- Housings for electrical assemblies
- High temperature RTV molding
- Water pumps
- Working prototypes
- Visual models

SL 5220 [Specifications] Multi-purpose Material

Cibatoool SL 5220 is an epoxy-based resin that offers parts that are strong, durable and multifunctional. SL 5220 fits a wide range of applications from form, fit and function to optical stress analysis, and as masters for secondary tooling applications. SL 5220 is accurate and is one of the fastest materials in its machine class, providing throughput up to two times faster than SL 5170 for the same layer thickness.

Ideal for:

- Working prototypes
- Visual models
- Optical stress analysis
- Multipurpose models
- Form, fit and functionality
- Investment casting patterns
- Prototype tooling
- Production tooling master patterns

SLA3500

SL 5190 [Specifications]

Multi-purpose Material

Cibatoool SL 5190 is an epoxy-based, photocurable resin that builds strong, durable and accurate parts. This resin works well for applications such as form, fit and function, photostress/photoelastic analysis and masters for secondary tooling. SL 5190 has several material properties which exceed or are comparable to medium-impact polystyrene.

Ideal for:

- Snap-fit assemblies
- Investment casting patterns
- Concept models
- Visual models
- Working prototypes

SL 5510 [Specifications]

Multi-purpose Material

Cibatoool SL 5510 is a versatile, accurate, dimensionally stable and highly productive material. For the most demanding applications, SL 5510 sets the industry standard for part accuracy.

Ideal for:

- High humidity applications
- Working prototypes
- Visual models
- Prototype tooling
- Production tooling master patterns
- Investment casting patterns

- Fluid flow studies of complex internal passages

SL 5520 [[Specifications](#)]

Specialty Material

Cibatoool SL 5520 expands the range of applications for stereolithography by providing a material that can withstand the rigors of real-world use, such as snap-fit casings, housings, assemblies, connectors and other parts. It produces humidity-resistant parts and assemblies with characteristics approaching engineering plastics.

Ideal for:

- Snap-fit assemblies
- Optically clear functional tests
- Electrical, computer, consumer appliance and camera housings
- Automotive interior components
- Consumer goods and appliances
- Connectors

SL 5530 [[Specifications](#)]

Specialty Material

Cibatoool 5530HT sets a precedent in the industry by providing the highest temperature resistance of any SL material on the market today - over 200°C (392°F)! It also performs extremely well in elevated temperatures for water, steam, and solvents (i.e. automotive oil and coolant).

Not only does SL 5530HT resist very high temperatures for functional testing under real operating conditions, it also provides optical clarity for flow visualization, and accuracy that allows production of prototypes that mirror the dimensions of the end-use part. In fact, it is the only rapid prototyping material offering all three of these characteristics.

Ideal for:

- Under-hood component testing
- Hot fluid flow visualization
- HVAC component testing
- Intake manifold testing
- Lighting fixture (housings, covers) testing
- Tooling/Vacuum forming, hot-melt tooling, high-temperature RTV molding

>Next: [Process Overview](#)